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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
FERNANDEZ RIVAS, OMAR F	

ART UNIT	PAPER NUMBER
2129	

DATE MAILED: 10/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/033,451	KAHOLA, MIKA	
	Examiner	Art Unit	
	Omar F. Fernández Rivas	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the arguments filed by the applicant entered July 25, 2005 for the Patent Application 10/033,451 filed on December 27, 2001.

2. The first Office Action of February 24, 2005 is fully incorporated into this Final Office Action by reference.

Priority

3. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 20002875, filed on December 28, 2000.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-16 are rejected under 35 U. S. C. 103 as being obvious over Agrawal et, al. U.S. Patent. No. 6072990 (Agrawal) in view of Lewis, U.S. Patent No. 5687290 (Lewis). Specifically:

Claim 1

Agrawal discloses a method for performing link adaptation in a communication system where two communication devices communicate by exchanging packet data (col.1, lin.53-54) in wireless environment. (Fig.1, Abstract, lin.1-3. Determine the operating point is performing link adaptation) The method determines packet error rate (Abstract, lin.3-5, word error rate and packet error rate are equivalent.), selects modulation mode from at least two, (col.5, lin.65-67; col.6, lin.1-2, encoding schemes include modulation modes)

Agrawal fails to teach the selection of operating parameters such as power level and modulation modes using fuzzy logic that treats packet error rate as one of fuzzy state variables and power level and modulation modes as fuzzy control variables. (col.5, lin.65-67; col.6, lin.1-8)

Lewis teaches a method using fuzzy control that takes inputs, process inputs using certain fuzzy rules and provide fuzzy output data representative of control actions in communication network environment. (col.3, lin.24-34)

Motivation: All communication networks require monitoring and control of network operation which artificial intelligence, such as Rule-Based-Reasoning, maybe used. If the network operates under unpredictable or rapidly changing domains, two problems arise. The first problem is that the RBR system fails when the system is presented with

a novel problem for which it has no applicable rules. Another problem is that lack of flexibility of "crisp logic" where only two values, "true" and "false" are allowed.(col.3, lin.19-67; col.2, lin.1-29) Lewis provides a more flexible approach than what Agrawal has used. (col.3, lin.9-12)

One of ordinary skill in the art would have provided the fuzzy control taught by Lewis for the purpose of determining operating parameters such as power level and modulation mode from measuring input data such as packet error rate using fuzzy control logic taught by Lewis. As a result it would have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify the system taught by Agrawal by adding the fuzzy control logic as taught by Lewis.

Claim 2

In the method taught by Agrawal as claim 1, a target value is determined to the packet error rate aimed to be kept substantially the same as the target value, and the difference between the packet error rate and target value is used as control variable in the method. (col.4, lin.30-45, acceptable word error range implies that there is a target value and the difference between the actual error rate and the target value, defined as error range, is acceptable.)

Claim 3

The method of claim 1 as taught by Agrawal, measures packet error rate (abstract, lin.4-12) and change of packet error rate (col.9, lin.5-7) for inputs of the method. The modified Agrawal's method by adding Lewis's fuzzy control logic takes packet error rate and the change of packet error rate as inputs represented as fuzzy control values, and a set of fuzzy rules is arranged, which are used for determining the effects of the control values to the modulation mode used as a controllable value. (abstract, lin.1-14; Agrawal measures packet error rate and the change of packet error rate as inputs to Lewis' fuzzy inference engine that produces control outputs such as power level and modulation modes as taught by Agrawal.)

Claims 9-11

In the method of claim 1, Agrawal teaches a transmitter that encodes transmitted data from encoding schemes that includes modulation modes. The operating point of transmitter is defined by power code that anticipates transmission power. The selected modulation modes and transmission power will produce desired packet error rate. (col.5, lin.65-67; col.6, lin.1-22. The encoding schemes are implemented using Lewis's fuzzy logic as taught in claim 1.)

Claims 4-6

Applicant's algorithm as set forth in claims 4-6 has been considered and is given little patentable weight. The algorithm is commonly taught in texts such as Kosko "Neural

Network and Fuzzy Systems and Dynamical Systems Approach to Machine Intelligence" page 306-322) and widely used such as Shen ("New Mobility Profile Prediction: An Adaptive Fuzzy Inference Approach" page 370), therefore it is merely a matter of engineering choice in design and not considered to provide any new or unexpected result.

Furthermore, one of ordinary skill in the art would have provided the algorithm, as a design choice taught by Kosko, for the purpose of implementing the fuzzy inference engine for the fuzzy logic taught by Lewis. As a result it would have been obvious to one of ordinary skill in the art at the time of applicants' invention further modify the system taught by Agrawal by choosing the algorithm taught by Kosko to implement the fuzzy inference engine taught by Lewis.

Claim 7

In the modified method of Lewis as defined in claims 3-6 in line with the method of claim 1 taught by Agrawal, the fuzzy control outputs include modulation modes, as in claim 1, each of which is defined as an individual index as in claim 6. The method of Lewis in view of Kosko has following steps:

An initiation phase, wherein one of said indexes is selected in order to select the modulation mode used in communication selection (It is inherent in the algorithm taught by Kosko that indexes are chosen to be able to use the algorithm in claim 5. In the context of claim 1 and 5, the indexes represent outputs that include modulation mode);

a computing phase, in which the difference of the packet error rate from the target value(Agrawal, col.4, lin.36), and the change rate of packet error rate are calculated; (Agrawal, col.9, lin.5, to response the change of error rate must be calculated.)
a fuzzy control phase, in which fuzzy control is used for defining the index change of the modulation mode and the modulation mode is selected according to the calculated new index. (It is inherent in the algorithm taught by Kosko that the fuzzy logic algorithm calculates the new index that represents fuzzy outputs that include modulation mode).

Claim 8

In the method of claim 7, the calculating phase and fuzzy control phase are repeated. (Agrawal, col.6, lin.17-22, Lewis's fuzzy control logic and Kosko's algorithm are used in the context of Agrawal, therefore the calculating phase and fuzzy control phase are repeated.)

Claim 12-14

Claims 12-14 are systems claims that correspond to method claims 1-3 respectively. Therefore claims 12-14 are rejected under the same rationale as cited in the rejection of rejected claims 1-3 respectively.

Claim 15

Agrawal teaches a system for transmitter and receiver pair in wireless communication network as discussed in claim 1. Even though Agrawal does not mention explicitly an

access point controller in the system, Agrawal does not limit the number of transmitter-receiver pairs and the type of communication terminals. (col.5, lin.60-64) Should the need of an access pointer controller. arise in the system taught by Agrawal, it would have been obvious for an ordinary skill in the art at the time of the invention to modify one of terminals in the communication system taught by Agrawal into an access point controller as one type on communication terminal in the system taught by Agrawal. By treating an access pointer as a wireless terminal claim 15 is rejected in the same rationale as the rejection rejected in claim 16.

Claim 16

Agrawal teaches a wireless terminal (Fig, 1 the transmitter 12 or receiver 13), comprising means for transmitting packet information at least partly wirelessly in a communication system arranged between the wireless terminal and a second communication device (Fig. 1 is the communication system with two communication devices communicating wirelessly), means for defining packet error rate (col.1, lin.54-64), and means for selecting modulation modes (col.6, lin.1).

Agrawal fails to teach selecting modulation modes using fuzzy control. Lewis teaches means for using fuzzy control for selecting modulation mode and at least packet error rate being used as one fuzzy variable as in claim 1. It would have been obvious to one of ordinary skill in the art at the time of applicants' invention to modify the system taught by Agrawal by adding the fuzzy control logic as taught by Lewis in the same rationale as explained in claim 1.

Response to Arguments

5. Applicant's arguments related to claims 1-16 have been fully considered but are not persuasive.

In reference to Applicant's argument:

The Examiner's analysis fails to indicate how you get from the simple feedback loop of the system of Agrawal to an artificial intelligence system, such as Rule-Based-Reasoning.

Examiner's response:

Lewis teaches the artificial intelligence system and motivation is provided for the combination of the references.

In reference to applicant's arguments:

There is no leap to artificial intelligence algorithms, nor any inference that such may be desirable. Further, there is no processing capability to accommodate such a modification.

Examiner's response:

Lewis teaches this, therefore it does not have to be in the base reference.

In reference to Applicant's arguments:

The purpose of Agrawal is to minimize control overhead. This teaches away from moving to artificial intelligence, including fuzzy logic.

Examiner's response:

Lewis is not considered to teach away from Agrawal or vice-versa. Motivation is for the improvement of the system described by Agrawal. Furthermore, overhead is not considered to be increased by Lewis.

In reference to Applicant's arguments:

Now, considering the word error rate versus packet error rate in more detail. On col. 1, lines 53-54, of Agrawal it is mentioned that "Data transmission is usually packetized into words so that the error granularity is at the word level." This may be the reason the Examiner has the opinion that the word error rate of Agrawal is the same as the packet error rate of the present application. It is also mentioned that for a given bit error rate (BER), the observed WER depends on the type of forward error correction scheme used (col. 1, lines 64-65). The term packetization is not quite the same than what is meant when packets are formed from information to be transmitted. One word usually comprises 8 bits which can be protected by error correction data, e.g. CRC

(Cyclic-Redundancy-Code). One packet usually comprises different fields, such as header, payload and may also comprise some kind of error correction data field. While it is true that there are similarities between packet error rate and word error rate but they are not equal terms.

Examiner's response:

Agrawal does teach packetizing as set forth at col. 1, lines 53-54. The point that the applicant is trying to make is definitional and not set forth in the claims.

In reference to Applicant's arguments:

Now considering about the terms "modulation mode" and "power code pair". As can be seen on Table 1 of the present application, there are several modulation modes in Hiperlan/2 standard of the ETSI organization. Those modulation modes define certain properties to be used when data to be transmitted is modulated: data speed, modulation method, coding ratio, codes per low carrier wave, codes per OFDM symbol, and data bits per OFDM symbol. The system selects among those modulation modes one for transmission. The modulation mode may change during transmission especially when channel conditions are varying. In the present invention, "...a set of fuzzy logic rules is formulated in such a manner that the packet error rate and the change rate of the packet error rate are used as values influencing the control. Thus, the modulation mode and the transmission power control are selected in accordance with the rules of fuzzy logic." Therefore, it is determined (on the basis of the packet error rate and the change

rate of the packet error rate) which modulation mode fulfils the requirements at a given time and that modulation mode is selected for use. In Agrawal, several power-code pairs are defined, i.e., for each power level (transmission power of a transmitter) a certain code is selected. This means that when the transmission power is changed to a new level, the code corresponding to that level will be used in the transmission. It can be seen that there is some analogy between the power-code pair and the modulation mode, although the combination of parameters is different.

Examiner's response:

In our interpretation of claim 1, the phrase "and for which" is considered to refer to the "packets" and not the "packet error rate". As such, Agrawal is considered to meet this limitation.

In reference to Applicant's arguments:

Applicant submits that the above described deficiencies of the primary reference Agrawal are not remedied by the proposed combination with the teaching of the reference Lewis. The combined references do not therefore support a prima-facie case of obviousness. The modification of the teachings of Agrawal or Lewis, in order to obtain the invention, as described in the claims submitted herein, would not have been obvious to one skilled in the art.

There is nothing in the reference Lewis which suggests that packet error rate may be used as a control variable in a fuzzy logic control engine. Likewise the reference

Agrawal is silent with respect to the desirability of using fuzzy logic. Applicant submits that the combination of the teachings of the cited references would be contrary to the stated purpose of Agrawal.

Examiner's response:

As set forth above, the combination of Agrawal and Lewis is considered to disclose each limitation of the claimed invention and motivation for the combination has been provided.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Correspondence Information

7. Any inquires concerning this communication or earlier communications from the examiner should be directed to Omar F. Fernández Rivas, who may be reached Monday through Friday, between 8:00 a.m. and 5:00 p.m. EST. or via telephone at (571) 272-2589 or email omar.fernandez rivas@uspto.gov.

If you need to send an Official facsimile transmission, please send it to (571) 273-8300.

If attempts to reach the examiner are unsuccessful the Examiner's Supervisor, Anthony Knight, may be reached at (571) 272-3687.

Hand-delivered responses should be delivered to the Receptionist @ (Customer Service Window Randolph Building 401 Dulany Street Alexandria, VA 22313), located on the first floor of the south side of the Randolph Building.

Omar F. Fernández Rivas
Patent Examiner
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Tuesday, October 18, 2005

Anthony Knight
Supervisory Patent Examiner
Group 3600